

# PROJECT facts

U.S. DEPARTMENT OF ENERGY  
OFFICE OF FOSSIL ENERGY  
NATIONAL ENERGY TECHNOLOGY LABORATORY

Petroleum Exploration  
and Production

06/2005



## MAJOR OIL PLAYS IN UTAH AND VICINITY

### Background/Problem

Proven reserves for Utah are relatively high, at 283 million bbl. Utah oil fields have already produced a total of 1.2 billion barrels of oil. However, the 13.7 million barrels of oil production in 2002 was the lowest level in over 40 years and continued the steady decline that began in the mid-1980s. The Utah Geological Survey (UGS) believes this trend can be reversed with the help of “play” portfolios. Oil plays are geographic areas with petroleum potential caused by favorable combinations of source rock, oil migration paths, reservoir rock characteristics, and other factors. Providing easily readable maps and digital formats for data will assist Utah’s independent operators to access information on various plays and apply it to exploration and production. With higher oil prices now prevailing, secondary and tertiary recovery techniques should boost future production rates and ultimate recovery from known fields. The detailed public information UGS is generating will be invaluable to these efforts.

### PARTNERS

**Utah Geological Survey**  
Salt Lake City, UT

### MAIN SITE

**Thrust Belt, UT & WY**  
**Uinta Basin, UT**  
**Paradox Basin, UT & CO**

### Project Description/Accomplishments

UGS identified three major plays in Utah, summarized the data, and identified the subplays in each region. They are the 1) Thrust Belt: Jurassic Twin Creek Limestone and Jurassic Nugget Sandstone; 2) Uinta Basin: Cretaceous Northern Green River Formation and Paleozoic deep, overpressured plays of the Uinta Basin; 3) Paradox Basin: Mississippian Leadville Limestone and Pennsylvanian Paradox carbonates.

Play portfolios were developed for Utah’s major oil producing provinces (Thrust Belt, Uinta Basin, and Paradox Basin), including adjoining areas of Wyoming and Colorado. The objectives for each phase of the work included: describe and map the major oil plays by reservoir; provide critical production and reservoir data; provide case-study field evaluations; summarize the state-of-the-art drilling, completion, and secondary/tertiary recovery techniques for each play; delineate the locations of major oil pipelines; describe reservoir outcrop analogs for each play in Utah; and identify land use constraints.

Utah’s most recent discovery in the Jurassic Navaho Sandstone is in the Utah Thrust Belt. The Wolverine discovery in Covenant field represents one of the most promising new onshore plays in the United States in recent years. Predictions are that the area has the potential to be a billion barrel province with perhaps another 10 fields to be discovered. UGS has collected oil samples from the Navaho Sandstone at Wolverine and will conduct an outcrop analog study in summer 2005.



*Nine Mile Canyon, Uinta Basin, UT.*



## CONTACTS

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## PROJECT DATA

**DE-FC26-02NT15133**  
Jul. 1, 2002-Jun. 30, 2005

**Total Project Value**  
\$350,832

**DOE/Non-DOE Share**  
\$175,416/\$175,416

## CUSTOMER SERVICE

**1-800-553-7681**

## WEBSITE

**www.netl.doe.gov**

The Utah/Wyoming Thrust Belt province in the Twin Creek Limestone was deposited in a shallow-water embayment. Identification and correlation of barriers and baffles to fluid flow and recognition of fracture set orientations in individual Twin Creek reservoirs are critical to understanding production rates, petroleum pathways, and horizontal well plans. The Nugget Sandstone and Twin Creek Limestone thrust belt plays are found in a band 40 miles east-northeast of Salt Lake City. The Nugget Sandstone is the most prolific oil reservoir in the Utah/Wyoming Thrust Belts, having produced over 288 million barrels of oil and 5.1 trillion cubic feet of gas.

The Leadville Limestone is a major oil and gas reservoir in the Paradox Basin of Utah and Colorado. The Leadville was deposited on a shallow, open-marine carbonate shelf. Hydrocarbons are produced from basement-involved, northwest-trending structural traps with closure on both anticlines and faults. Excellent outcrops of the Leadville along the south flank of the Uinta Mountains provide analogs to the subsurface reservoir.

The shallow shelf carbonate mounds of the Paradox Formation are the second major producing area in the Paradox Basin. Located in the southern part of the basin these fields have yielded over 400 million barrels of oil, more than half from the giant Aneth field. Enhanced recovery at Aneth field makes use of CO<sub>2</sub> flooding. DOE funded studies have shown the potential for CO<sub>2</sub> floods and horizontal wells in the small isolated carbonate fields in the Paradox Basin.

The Uinta Basin produces mainly from the Green River Formation and deeper (to 16,000 feet) overpressured zones. Structural controls are a major factor in exploration of the deep overpressured plays. In the Uinta Basin ultimate best practices for recovery include waterflood, CO<sub>2</sub> injection, and horizontal drilling. Recent successes in the Uinta Basin have included gas production from the deep Triassic Wingate and the Jurassic Entrada formations.

## Benefits/Impacts

The objective of the project was to acquaint Utah independent producers with the wealth of information available from UGS to encourage development of Utah's abundant reserves. The new map, *Oil and Gas Fields of Utah* (Utah Geological Survey Map 203DM), is available in both hard copy and digital formats. It presents a wealth of information: the locations of oil and gas fields, major oil and gas pipelines, natural gas processing plants, and oil refineries. It also outlines key geologic/physiographic features such as major plateaus, uplifts, and sedimentary basins.

Over 125 fields discovered in Utah's major oil provinces, with production from a

combined 4,300 wells, are summarized in the play portfolios. The oil and gas map makes available to the general public and all parties interested in any aspect of oil and gas development and management the current distribution of natural resources and petroleum infrastructure in Utah.



View of the Utah Thrust Belt.